Report October 5, 2022

Summary:

- **Kapton Armors the Switches**
- **US Government Announces $50 Million for Private Fusion**
- **Big Bust Debate in London Focuses on Science**

Kapton Armors the Switches

The LPPFusion team is closing in on the design that will prevent all undesired breakdowns in the switches. The key is a two-layer defense-in-depth covering the metal surfaces with adhesive Kapton film, protected by the sealed Teflon disks.

In August, the Teflon disks sealed against the copper had protected against vertical breakdowns in the switches that led to pre-fires. But as the LPPFusion team reduced the pressure in the switches to seek faster firing, the breakdowns recurred. Now, the Kapton film, sealed by adhesive to the copper, has stopped the breakdowns even at the lowest pressures needed. The seal prevents gas from reaching the copper at any point, except the exposed electrodes where the breakdown is supposed to occur. In turn, the Teflon disks prevent gas from reaching the Kapton film, protecting it against chemical erosion.

The final step in implementing this new design is in applying it to the horizonal breakdown that occurs when the negative trigger voltage appears on the central pin (see Figure.1). The horizontal breakdown to the outer electrode can occur before the intended vertical breakdown that starts the current flowing. This produces a negative current that contributes to the disruption of the filaments in our FF-2B fusion device. To stop this breakdown, we are putting the same Kapton and Teflon armor on the inner surface of the top electrode. This will be ready for testing in October, hopefully leading to resuming firing with functional switches in November.

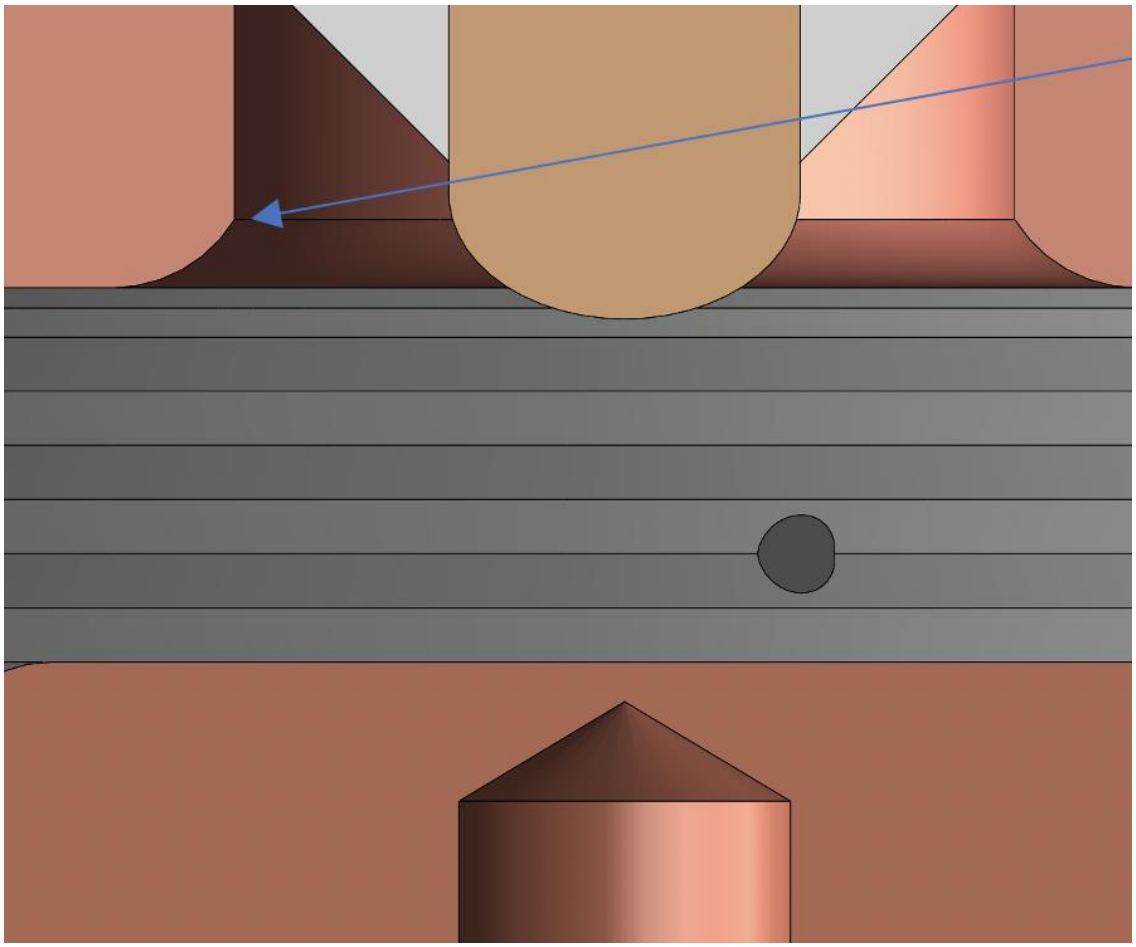

Figure 1. Horizontal breakdown between the top electrode (arrow) and the central pin (beige) prevents proper switch functioning. The intended breakdown is between the central pin and the bottom electrode (lower copper-colored strip) which releases the charge in the capacitor. Current then rapidly jumps over to connect the top and bottom electrodes to complete the circuit. To prevent the horizontal breakdown, we are armoring the inner radius of the top electrode with Kapton and Teflon.

With Kapton on our switches and beryllium in our central FF-2B electrodes, LPPFusion is using the same key materials as does the James Webb Space Telescope, which has been producing such

revolutionary results in astrophysics. JWST uses Kapton film for the five layers of its big solar shield and beryllium for its 6.5 meter mirror.

We at LPPFusion share our supporters' frustration that fixing the switches is taking so long. But this is mainly a result of our continued staff shortages. In turn, hiring more staff is depending on a greater level of capital fund-raising. To fix this crucial problem, we are aiming immediately to maintain a fundraising level of $100,000 per month, $1.2 million per year, to almost double our funds available. Our goal of achieving $500,000 from Wefunder by October 31 is part of this immediate objective. Our medium-term goal is to achieve $2 million per year.

These goals are achievable with the help of our supporters. Our reports, videos and social media posts are regularly seen by over 20,000 people a month. If just half of our readers invested in one share, $200, per year, we would reach $2 million per year. That's 55 cent per day, one latte a week.

US Government Announces $50 Million for Private Fusion

DEPARTMENT OF ENERGY (DOE)
OFFICE OF SCIENCE (SC)
FUSION ENERGY SCIENCES (FES)

MILESTONE-BASED FUSION DEVELOPMENT PROGRAM

On Thursday, September 22, the U.S. Department of Energy announced $50 million in new funding for a milestone-based public-private partnership program intended to accelerate planning for fusion energy pilot plants. This new program was first authorized by Congress in the bipartisan Energy Act of 2020 and funded for the 2022 Fiscal Year. The $50 million in funding over 18 months will be matched by private sector investment to plan ways to build Fusion Pilot Plants. However, only further funding will unlock further progress towards actually building the pilot plants on an accelerated timeline. The program is authorized by Congress at up to $415 million through 2027.

The partnership program is a step in the right direction, as the first substantial program matching private sector fusion funding dollar for dollar. LPPFusion intends to submit a four-page preapplication by the tight deadline of October 20. If we are accepted for the main application by Nov.3, we'll submit that before the Dec.15 deadline.

However, the program falls considerably short of the all-out program for fusion we and other in the Fusion Industries Association have been advocating, which would fund all possible routes to fusion at the maximum level each project could use. First, the program will make only 3-5 grants, so the DOE will again be trying to "pick the winners" at a time when that is plainly impossible. Second, the "minimum expected award" is $5 million. While this does not flat-out prohibit smaller awards, it does seem to bias the program towards the largest companies which can raise $5 millions of their own money in the next 18 months. Third, the structure of the program appears to favor consortiums of private companies with national laboratories, thus further filtering the routes to fusion.

Big Bust Debate in London Focuses on Science

LPPFusion's Eric Lerner debates the reality of cosmic expansion with Dr. Julian Barbour and Dr. Claudia Maraston (far right) as Jess Wade moderates. Photo by Ivy Karamitsos

"Cosmology and the Big Bust" was the title of the debate October 1 at the How The Light Gets In festival in London and the question was whether it was time to junk the Big Bang hypothesis. LPPFusion Chief Scientist Eric Lerner debated with University of Portsmouth's Dr. Claudia Maraston and independent physicist Julian Barbour. In contrast to the outraged and ad hominem responses posted by Big

Bang supporters on the web, the debate was held in a friendly atmosphere and concentrated on scientific points, a big step forward.

In both the debate, and at greater length in a subsequent presentation, Lerner emphasized the key Tolman test of the reality of expansion of the universe. As explained in earlier reports, this test predicts radically different angular sizes for galaxies at high redshifts, a test the Big Bang expansion hypothesis spectacularly funks with the new James Webb Space Telescope (JWST) images. He also pointed to the gains in scientific knowledge of plasma physics, vital to the fusion energy effort, which could come from junking the wasteful investigation of inflation, dark energy, dark matter and the other imaginary entities propping up the expansion hypothesis.

In response to Lerner's point on the Tolman test, Dr. Maraston doubted that the tiny images seen by the JWSTwould turn out to reflect the real total sizes of the galaxies. However, Lerner pointed out that the measurements are actually based on how rapidly the light falls off going out from the center of the galaxy, so is quite a robust result. Dr. Maraston said that, given the problems of the Big Bang, people might abandon it if there was a viable alternative, but pointed to the younger galaxies at high redshift and the helium abundance as evidence that the Big Bang hypothesis could make some correct predictions. Lerner's colleague Dr. Riccardo Scarpa, of the Instituto de Astrofisica de Canarias, pointed out during the audience discussion

that distant quasars in fact looked almost identical to near ones and that the youngest galaxies, being the brightest, could more easily be seen at great distances.

Dr. Barbour presented his own, somewhat intermediate position that the universe was changing shape rather than expanding, although he said his position was closer to Dr. Maraston's than to Lerner's.

Both Lerner and Scarpa were interviewed by IAI-TV. Dr. Scarpa explained how he had started collaborating with Lerner almost 20 years ago. He had invited Lerner to be a visiting scientist at the European Southern Observatory in Chile in 2005, where he, Lerner and colleague Dr. Renato Falomo pursued the Tolman test research that produced decisive evidence against cosmic expansion. Unfortunately, within days of Lerner's departure, Dr. Scarpa was informed that his contract would not be renewed, an example of the fierce opposition to open debate which has permeated cosmology for years. Dr. Scarpa also explained additional lines of evidence against dark matter involved in the development of Modified Newtonian dynamics, a possible extension of general relativity to extremely weak gravitational fields.

LPPFusion's Director of Communications Ivy Karamitsos was also interviewed by another IAI-TV crew, who were asking the question:

”What makes you optimistic?”. Karamitsos explained the hope that fusion energy would bring to humanity.

IAI expects that videos of the debate, presentations and interviews will be available on their website (some only to subscribers) in the next few weeks. In the meantime, discussions are underway concerning follow-up debates in an academic setting.